THE ROLE OF BOREDOM IN THE PURSUIT OF NEGATIVE EXPERIENCE

A Dissertation

by

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ABSTRACT

Motivational hedonism holds that the ultimate goal of behavior is to maximize pleasure and avoid pain. This investigation was meant to explore if a negative experience would be chosen over a more positive experience, and what might motivate this behavior. It was predicted that boredom would motivate a desire for novelty, resulting in anti-hedonic behaviors. Participants viewed a series of images (to induce boredom) and then chose the second set of images they would view, with one of the options being hedonically negative. Participants that reported a higher degree of boredom were more likely to choose the negative image set. Manipulated boredom was found to indirectly predict choice of image set through the effect on desire for novelty. Those placed in a high state of boredom, reported a stronger desire for novelty, which resulted in a higher probability of selecting the negative image set. When given options to choose a better or worse affective state from current, participants that experienced higher levels of state boredom, were more likely to choose a worse experience. In the final study, preference for an anti-hedonic option was found to play an important role in choice, such that, participants that liked the negative image set were less likely to make a choice motivated by a desire for novelty. These findings reveal that people will make anti-hedonic choices when their current state evokes boredom.

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1. INTRODUCTION

Ancient Greek philosophers, such as Epicurus and Aristippus, argued that the ultimate motivation for all behavior is to gain pleasure, and avoid pain. This theory is known as motivational hedonism, and argues that the driving factor behind behavior is the maximization of pleasure. Behavior, however, is not always consistent with this proposal. For instance, in 2012 horror films grossed over $400,000,000 in the United States (Nash Information Services, 2013). Further, an original copy of Edgar Allan Poe's *Tamerlane and Other Poems* recently sold for $662,500 – a record for a piece of American literature (New York Daily News, 2009). Poe is of course notable for his dark, scary and depressing style of writing. These examples illustrate a truth about human behavior that is difficult to reconcile with hedonistic principles - at times, people choose to pursue negative experiences - they watch scary movies, look at the gruesome aftermath of an accident, and listen to depressing songs.

The basic tenet of motivational hedonism has had a tremendous impact on psychological and economic theory (Erber & Erber, 2000). The presumption that people are motivated to pursue pleasure (positive experiences), and avoid pain (negative experiences) has played a prominent role in many theories yet seldom is this assumption directly tested (Erber & Erber, 2000). For instance, decision models have argued that in a given situation, the option that provides the most utility (i.e., joy) is chosen (e.g., Edwards, 1962; Savage, 1954; von Neumann & Morgenstern, 1944). Apparent deviations are explained away as a failure to properly understand the perceived benefits

and costs, or errors in judgment (e.g., Mellers, 2000), rather than as preference for anti-hedonic options. Building upon early decision models, recent models of choice have focused directly on the role of expected pleasure and positive emotion on decision making (Mellers, 2000; Mellers, Schwartz, & Ritov, 1999). Theories of emotion have also relied on the assumptions of motivational hedonism as demonstrated by the presumption that positive emotions (e.g., happiness) are more desirable than negative emotions (e.g., sadness, anger; Izard, 1971). As a final example of the pervasiveness of hedonistic assumptions, theories of emotion regulation have assumed that people desire to feel positive, and will regulate emotions in effort to maintain a positive feeling, or to return to a positive state (Andrade, 2005; Tice & Bratslavsky, 2000; Tice, Bratslavsky, & Baumeister, 2001).

Much of human behavior does tend to agree with these proposals, as the majority of people report, on average, being happy (Diener, 2000; Diener & Diener, 1996; Meyers, 2000), and that the most important goal in life is "to obtain happiness" (Diener, 2000). However, daily experience suggests that at times negative experiences may be desired and chosen over positive experiences. A negative experience is defined as any event or stimulus that elicits negative affect, and is expected to do so by the individual choosing it (i.e., people are aware that the experience will make them feel badly). In contrast, the term 'desire' is used to mean longed for or wished for. Thus positive or negative experiences could be desired in the sense that people want to experience them. The goal of this investigation was to explore when a negative experience might be

chosen (anti-hedonic behavior), and examine the motivational role that boredom plays in the desire for negative experience (anti-hedonism).

1.1 Seeking Negative Experience

Several recent accounts have proposed that experiences of negative emotions are not always avoided, and in some cases are even preferred to positive emotions (Andrade & Cohen, 2007; Erber & Erber, 2000; Harmon-Jones, Harmon-Jones, Amodio, & Gable, 2011; Tamir, 2009). Three main theories have been proposed to account for these preferences. The first suggests that these preferences are not truly anti-hedonistic and is based on research that has suggested that positive and negative emotions can be experienced simultaneously (mixed emotions; Larsen & McGraw, 2011; Larsen, McGraw, & Cacioppo, 2001; Schimmack, 2001). Thus, a seemingly negative experience might actually contain positive elements (Andrade & Cohen, 2007). For example, poor acting during a horror movie might cause a person to laugh during an otherwise terrifying scene. The existence of mixed emotions, however, is debated, with some researchers arguing that the reports of mixed emotions are due to experimenter demand characteristics, or unnoticed rapid changes in consecutive experiences of differing emotions (Brehm, 1999; Brehm & Miron, 2006). Further, this work does not suggest or provide an explanation for instances in which people might choose mixed experiences over purely positive experiences.

The second theory also suggests that these preferences are not truly anti-hedonic and focuses on individual differences in subjective experience for specific emotions, with some individuals responding to emotions typically considered negative (e.g., anger,

disgust, fear) in a positive way. According to theories of attitudes towards emotions, people possess varying preferences towards specific emotions (Harmon-Jones et al., 2011; Izard, 1971, 2009) and may select experiences that will elicit their preferred emotion (Harmon-Jones et al., 2011). That is, some people might choose negative experiences because they like that emotional experience more than other people (e.g., enjoying the terror experienced during a horror film). Associated findings reveal individual differences in preferences for emotions and the tendency to choose situations that elicit the preferred emotions. However, despite individual variation, joy was consistently the most preferred emotion relative to all negative emotions (sad, fear, anger, disgust; Harmon-Jones et al., 2011). Thus, this account alone cannot explain instances in which people choose experiences that will elicit negative emotions over alternative experiences that will elicit positive emotions.

The third explanation also suggests that anti-hedonic preferences are not truly anti-hedonic in the sense that the choices are likely to result in some benefit. The basic argument is that, in certain situations, a specific emotion (e.g., fear) may serve to complete an objective (e.g., escaping a threat), and therefore the immediate pursuit of pleasure is delayed in favor of the instrumental success made possible by a negative experience (Clore & Robinson, 2000; Cohen & Andrade, 2004; Martin, 2000). Erber and colleagues (Erber & Erber, 2000; Erber & Tesser, 1992) proposed, and demonstrated, that emotion regulation is not always employed to maintain positive feelings, or to remove negative feelings. Sadness or happiness was induced in participants before they completed difficult math problems. In both conditions, participants reported lower levels

of the elicited emotion on a mood survey completed after the test, compared to control conditions (participants that did not complete a math test, and instead waited for 10 minutes after the emotion manipulation). For participants in the happy condition, this demonstrates that they did not focus on maintaining a positive experience as would be predicted by hedonism. Further, sad participants in the control condition (that did not take the math test) showed no effort to regulate their emotion to return to a positive state (i.e., they were still sad; Erber & Tesser, 1992). This shows that people do not always regulate their emotions to make positive moods last, and that negative emotions are not necessarily quickly regulated to return to a positive state. Indeed, several theorists have argued that emotion regulation is not strictly guided by maintaining immediate pleasure (e.g., Clore & Robinson, 2000, Cohen & Andrade, 2004; Erber & Erber, 2000, Martin, 2000, Martin & Davies, 1998). While this work does not demonstrate, or propose, that people actively pursue negative experiences (especially when there is no benefit), it does provide evidence that negative experiences will be tolerated in specific situations.

Building on previous work and theory (Clore & Robinson, 2000; Cohen & Andrade, 2004; Erber & Erber, 2000; Erber & Tesser, 1992), the instrumental account of emotion regulation goes a step further to demonstrate that negative experiences may be actively chosen in the pursuit of goals. This account holds that emotional experience can be regulated for short-term hedonistic purposes, or to facilitate accomplishment of long-term goals (Tamir, 2005; 2009). That is, people can choose to experience immediate pleasures, or choose a negative experience that serves a function for the success of a long term goal. This idea derives from theories of emotion that argue emotions enable

systems (e.g., physiology, motivation, cognition) for the pursuit of goals, that is, emotions serve a specific function (Carver, 2004; Frijda, 1986; Lench & Levine, 2005; Lench, Flores, & Bench, 2011; Keltner & Gross, 1999; Oatley & Jenkins, 1992). Emotions indicate the status of current progress toward a goal, and enable systems for goal directed behavior (Carver, 2004). Thus, an instrumental account of emotion regulation argues that both positive and negative emotions can facilitate goal pursuit and experiences that result in negative emotion are selected when they are helpful for goal pursuit (Tamir, 2005, 2009; Tamir, Mitchell, & Gross, 2008).

This instrumental account of emotion regulation was recently tested in a series of groundbreaking studies (Tamir et al., 2008). The studies established that people do choose negative experiences, and that this is done to facilitate goal pursuit. Participants were told that a game they were about to play was either a confrontational game or a nonconfrontational game. Before playing the game, they listened to samples of songs that had been shown to elicit anger, excitement or a neutral state, and were asked to select the song they would like to listen to before playing the game. Results showed that before playing a confrontational game, participants preferred to listen to music shown to elicit anger, but not before playing a nonconfrontational game. Further, participants that chose to experience anger performed better on the confrontational game, but not on the nonconfrontational game (Tamir et al., 2008). Using a similar design, a series of studies demonstrated that fear would be chosen over other emotions (excitement, anger) when an avoidance goal was beneficial for success in a game (Tamir & Ford, 2009). These findings supported the instrumental account of emotion regulation by demonstrating that

people will choose negative experiences when that experience is likely to result in benefits. This explanation, however, is limited in that it only explains apparent anti-hedonism when negative experience serves a purpose. Yet people often seem to pursue negative experiences that are unlikely to help them fulfill their goals, such as watching a horror film or looking at the remains of an animal on the side of the road. In this investigation, I propose and test the possibility that anti-hedonic behavior without a benefit might be motivated by boredom and the resulting desire for novelty.

1.2 Boredom

Boredom is an emotion (Barbalett, 1999; Bench & Lench, 2013; Dramrad-Frye & Laird, 1989; Farmer & Sundberg, 1986; Izard, 1977; Pekrun, Goetz, Daniels, Stupinsky, & Perry, 2010; Scherer, 1984; van Tilburg & Igou, 2012; Vodanovich, 2003a), and is considered an aversive experience. Not much is known about state boredom or its consequences. Although it is commonly experienced (Eastwood, Frischen, Fenske, & Smilek, 2012), boredom has received little experimental attention (Bench & Lench, 2013; Eastwood et al., 2012; van Tilburg & Igou, 2012; Vodanovich, 2003a). Indeed, a recent meta-analysis on the emotions happiness, sadness, anxiety, and anger found an average of 128 experimental articles detailing each (Lench et al., 2011), but a similar search found only 12 experimental articles on boredom (Bench & Lench, 2013). This might be the result of an assumption that boredom is inconsequential, but, given the frequency with which it is experienced, it is much more likely that boredom is a key construct to understand and predict human behavior.

I recently argued that boredom signals that the current situation is no longer stimulating and encourages the pursuit of alternative situations (Bench & Lench, 2013). Specifically, boredom arises due to the perception that the current situation is no longer stimulating, as reflected in diminishing emotional response to the situation, and results in actions and cognitions that promote goal switching. That is, a state of boredom encourages the pursuit of alternative goals. This is proposed to occur by creating a desire for novelty. A novel experience is defined as one that will elicit an affective state that is different from the current state. It does not require that there is no previous experience with the stimulus (though a completely novel option may become more desirable as state boredom increases), but rather than if one is bored with, for example, a positive experience, one would be more likely to desire a hedonically novel negative experience.

If boredom increases a desire for novelty, resulting in the pursuit of affectively-different alternatives, it provides a promising explanation for anti-hedonic behavior. For instance, during a long drive on an empty straight road, a person might become bored and attentively look at an animal corpse on the side of the road. Correlational research on the associations between trait boredom and risky behaviors partially supports this proposal, as trait boredom has been related to problem gambling (Blaszczynski, McConaghy, & Franknova, 1990; Mercer & Eastwood, 2010), substance abuse (Lee, Neighbors, & Woods, 2007; LePera, 2011), and binge eating (Abramson & Stinson, 1977). However, these findings must be interpreted with caution because risk-taking is not necessarily anti-hedonic and may provide a chance of positive experiences accompanied by risk of negative outcomes, the findings are correlational, and trait and

state emotions have been shown to have quite different effects in a number of domains (Broadbent & Broadbent, 1988; Gaudry, Vagg, & Spielberger, 1975).

To date, one experimental study has examined the effect of boredom on anti-hedonic behavior (Larsen & Zarate, 1991). Participants completed a task to induce boredom, and were told that, due to time constraints, they could only complete one of two follow up studies. They were then allowed to choose between one study described as completing questionnaires of common events (e.g., how often do you eat breakfast), or a study that involved watching a film that would elicit intense negative feelings and high arousal. A proportion of participants (23%) chose the negative film. Those that chose the negative film were those that were classified as "reducers" by the reducer/augmenter scale, who are proposed to experience a lower level of sensory stimulation (Larsen & Zarate, 1991). According to reducer/augmenter theory (Petrie, 1967), people differ in the amount they respond to sensory stimuli, with reducers being those that are less responsive. While this study demonstrated that boredom might be related to anti-hedonic behavior, in that those who require more stimulation were more likely to choose negative experiences, the design confounded negative affect with high arousal, so participants might have chosen the negative film for the arousal. Further, one of the options sounded boring (surveys) and the other sounded interesting (film), and it has been established that boredom is an aversive state. Thus participants might actually have been choosing the option that they expected to result in the most hedonic pleasure.

The current investigation had three goals: 1) to assess if anti-hedonic options might be chosen when there is no benefit associated with that choice, 2) to examine the

relationship between boredom and anti-hedonism, and 3) to explore the role of desire for novelty, created by state boredom, in anti-hedonic behavior. That is, this investigation examined the extent to which boredom encourages a desire for novelty which can result in anti-hedonic behavior. Akin to other emotions, boredom should serve a specific function, and organize systems in the service of that function (Lench, Bench, & Darbor, under review; Bench & Lench, 2013). Specifically, boredom signals that the current situation is no longer beneficial for goals. Boredom should then motivate a desire for novelty, or a situation that differs from the current experience (Bench & Lench, 2013). Importantly, as boredom indicates that a change should be made, and motivates efforts to change, the type of outcome that becomes desirable would be dependent upon the boredom-inducing reference point. In other words, the situation that elicited boredom would dictate preference. That is, if boredom is from the result of a negative experience, something positive would be desired. If boredom results from positive experiences, negative experiences would be desired.

2. STUDY 1

Study 1 examined the extent to which self-reported boredom following a series of neutral images could result in participants choosing a set of negative images – an anti-hedonic choice. This study was designed as an initial test of the relationship between state boredom and anti-hedonic experience. It was predicted that higher levels of state boredom would predict an anti-hedonic choice. This study also examined the potential role of trait boredom, which has previously been show to relate to preferences for risky choices (i.e., high risk, high pleasure options).

2.1 Participants

Fifty-one college students (67% female) completed the study for partial course credit in their introduction to psychology course. Four participants were removed due to data loss through computer or experimenter error.

2.2 Procedure

Participants were told they would be viewing a series of images and to pay careful attention as they would be asked to answer questions about the images at the end of the study. They then viewed nineteen neutral images that were pilot tested by another sample (n = 26, on a scale ranging from *Completely negative* (1) to *Completely positive* (9), and were rated as near the scale midpoint of neutral (M = 5.63, SD = .63); see Pilot 1 in the Appendix).

Before each image, a fixation cross was displayed in the middle of the screen for 500 milliseconds (ms), immediately following the fixation cross, one of the 19 images

appeared and remained on the screen for 5 seconds. Participants viewed each of the 19 images either three or six times (boredom did not vary based on viewings and number of views is not considered further). The images were presented in random order. After viewing all of the images, participants were told that they would now observe another set of images, for the same amount of time as the first set. For this set, however, they were allowed their choice of two sets of images. One set was described as similar to the neutral images they just viewed; specifically they were told "This set of images is similar to the set of images you just saw." For the other set, they saw three sample negative images (cockroaches, a destroyed building, dirty dishes; IAPS numbers: 1274, 9471, 9395) and were told that "The rest of the images in this set are similar to those sample images." Before each sample image, a fixation cross was displayed for 500 ms in the middle of the screen. Each sample image remained on the screen for 5 seconds. After seeing all three sample images, participants were asked: "Would you like to view the set of images that the three sample images represented, or a set of images that is similar to the images you saw at the start of the study?" Once participants made their choice by hitting A or B on the keyboard, they were informed that they would not actually view the second set of images.

Participants then rated how they currently felt on a scale ranging from *Incredibly entertained* (1) to *Incredibly bored* (9). Participants also completed the Boredom Proneness Scale ($\alpha = .72$; BPS; Farmer & Sundberg, 1986). The BPS is the most widely used measure of trait boredom (Vodanovich, 2003), and includes items such as "Many things I do are repetitive and monotonous". The scale consists of 28 items rated on a

scale ranging from *Highly disagree* (1) to *Highly agree* (7). The BPS was included to assess if trait boredom impacts the choice to view negative images, and to examine the relative impacts of trait and state boredom on choice.

2.3 Results and Discussion

Overall, twenty-eight (55%) participants chose to view the negative image set. This is of considerable interest as it is counter to the hedonistic prediction that negative experiences are always avoided (e.g., Tice et al., 2001), and demonstrates that a negative experience will be chosen even when there is no clear benefit for the choice.

To examine the predictive value of state boredom and trait boredom on choice of image set, a logistic regression was conducted. Choice of image set was regressed on state boredom and trait boredom, and revealed that state boredom predicted choice, Wald = 5.14, β = 0.49, p = .023, e^{β} = 1.64. Specifically, as participants experienced a higher level of boredom, they were more likely to choose the negative image set. Trait boredom did not predict choice of image set, Wald = 0.09, β = 0.01, p = .77 e^{β} = 1.01, and there was no interaction between state and trait boredom, Wald = 2.35, β = 0.04, p = .13, e^{β} = 1.04. Trait boredom also did not predict choice of image set when entered alone, Wald = 1.44, β = 0.03, p = .23, e^{β} = 1.03. Finally, trait boredom also did not predict state boredom, β = -0.005, t(49) = -0.26, p = .80.

State boredom, but not trait boredom, predicted choice, such that, with higher levels of state boredom, participants were more likely to choose the negative image set. This supports the theory that boredom can prompt people to seek out negative experience when that experience differs from the affective state that induced boredom

(Bench & Lench, 2013). Importantly, there was no reason for participants to believe that there was any benefit of selecting the negative image sets. The findings from this study demonstrate that, even in the absence of a clear benefit for choosing negative experiences, boredom can motivate anti-hedonic behavior.

3. STUDY 2

Study 1 demonstrated that negative experiences are at times selected over neutral experiences. Further, state boredom predicted whether or not participants selected the negative experience, with higher levels of boredom predicting a higher probability of choosing the negative experience. However, these findings were correlational. Further, the negative image set was the only novel option (the neutral images were described as similar to the images previously seen). As a result, it is not clear if participants selected the negative images because they represented an affectively different experience or simply a different experience. Study 2 included an experimental manipulation of boredom and all image options were novel. To address the theorized importance of a desire for novelty in anti-hedonic choice, a measure of desire for novelty was included in Study 2 and was expected to mediate the relationship between boredom and choice of negative experience. Specifically, it was predicted that participants in a condition that elicited an intense state of boredom would report a strong desire for novelty, and a high desire for novelty would predict choice of a negative experience.

3.1 Participants

One hundred fifty (65% female) college students completed the study for partial course credit in their introduction to psychology course.

3.2 Procedure

As in Study 1, participants were told they would view a set of images and to pay attention to the images. They viewed 15 of the neutral images used in Study 1.

Participants were randomly assigned to one of two conditions varying in boredom (low boredom, high boredom). In the low boredom condition, participants viewed the image set either three times or no times (both groups reported a moderate level of boredom and they did not differ on any other measure, all t's < 1.50, all p's > .14). In the high boredom condition, participants viewed the image set 10 times. Ten views was used based on pilot testing (n = 63) that revealed more boredom after the induction than before the induction, $t(62) = 9.53$, $p < .001$, $d = 2.42$, with no significant increase in boredom after ten views (compared to 12 or 14 views; see Pilot 3 in the Appendix).

Participants were then informed that they would choose the (next) set of images they would see, specifically, "You will now be viewing another set of images. This set of images will be displayed for the same amount of time as the previous set. You will see samples of two possible sets of images that are representative of two separate sets of images. You will have your choice of which of the sets of images you will view. Please choose the set you would like to see based on the sample images you are shown." The negative sample set was the same three negative images used in Study 1. The other sample image set consisted of three novel neutral images (a park bench, a light bulb, a plate; IAPS numbers: 7026, 7170, 7233). The set of sample images that was displayed first was randomly generated, and all sample images in that set were displayed before the next set was shown. The image sets were labeled "Set A" or "Set B," with neutral or negative images counterbalanced between set A and B. Before each image appeared, a fixation cross was placed in the center of the screen for 500 ms, the sample image

followed and remained on the screen for 5 seconds. After viewing both sets of sample images, participants were asked to choose which image set they would like to view.

After choosing their set of images, participants reported their current level of boredom, on a scale ranging from *Not at all* (1) to *Incredibly* (9). Participants then reported the influence a desire for something new had on their choice, "How much did a desire for something new motivate your choice?" Responses were given on scale ranging from *Not at all* (1) to *Completely* (7). Trait boredom, as measured by BPS scores, did not predict desire for novelty, state boredom, or choice of image set, all p's > .19, and is not reported further. After completing all scales, participants were told that they would not view the second set of images and debriefed.

3.3 Results and Discussion

Participants in the high boredom condition reported being more bored (M = 7.20, SD = 1.78) than those in the low boredom condition (M = 4.93, SD = 1.53), $t(85.72)$ = 7.70, $p < .001$, d = 1.66. Thus the manipulation was effective at eliciting a high and low state of boredom. Further, participants in the high boredom condition reported a greater desire for novelty (M = 4.74, SD = 1.85), the proposed mediator, than those in the low boredom condition (M = 3.69, SD = 1.85), $t(148) = 3.28$, $p = .001$, $d = .54$. Novelty is more desirable in an intense state of boredom, relative to a weak state of boredom.

Overall, thirty-four (23%) of participants chose to view the negative image set. As in Study 1, this suggests that a negative experience will be chosen when there is no clear benefit for doing so. Additionally, this finding demonstrates the importance of novelty in this choice. Half of participants chose the negative image set in Study 1, but

only a quarter of participants chose the negative images in Study 2, when both of the available options were novel. This suggests that a general desire for novelty, in addition to a desire for affectively different states, contributes to choices of negative experiences when bored.

An indirect effect of condition (low boredom, high boredom) on choice of image set was expected, with the relationship between condition and choice mediated by desire for novelty. Specifically, it was predicted that participants in the high boredom condition would have a stronger desire for novelty, and an intense desire for novelty would drive choice of a negative experience. To examine this relationship, a mediation analysis was conducted utilizing the PROCESS script from Hayes (2013), which is designed to handle dichotomous outcomes, and used 10,000 bootstrapped samples. As can be seen in Figure 1, condition (low boredom, high boredom) predicted desire for novelty, $b = 1.05$, $t = 3.28$, $p = .001$, with participants in the high boredom condition reporting a greater desire for novelty compared to the low boredom condition. Desire for novelty, in turn, predicted choice of image set (coded: 0 = neutral, 1 = negative), $b = .26$, $z = 2.29$, $p = .022$, with a stronger desire for novelty predicting the choice of the negative image set. In the mediational model, there was no direct effect of condition on whether or not participants chose the negative images, $b = .19$, $z = 1.10$, $p = .27$. Rather, consistent with predictions, there was an indirect effect of condition on whether or not participants chose the negative images (indirect effect = .27, 95% CI [.04, .69]). Desire for novelty mediated the relationship between condition (low boredom, high boredom) and anti-hedonic choice (MacKinnon, Lockwood, Hoffman, West, & Sheets, 2002). In other

words, participants in the high boredom condition reported greater desire for novelty than those in the low boredom condition, and greater desire for novelty resulted in a greater likelihood of choosing the negative image set.

These findings demonstrate the importance of desire for novelty in the choice of negative experiences. Consistent with the theoretical model, greater boredom motivated greater desire for a new experience, which led to choosing a negative experience that differed affectively from the state that elicited boredom.

4. STUDY 3

Study 3 was designed to examine whether people, after a state of boredom was induced by a positive or negative experience, would choose worse options when they had multiple choices among positive and negative options. Participants were given the opportunity to choose an affective experience that was better than (i.e., more positive), worse than (i.e., more negative) or affectively the same as, the experience that made them bored. To identify "better" and "worse" states, I relied on the assumption that positive emotions are preferred to negative emotions (Harmon-Jones et al., 2011) and the assumption that more intensely negative states are worse than less intensely negative states, and that more intensely positive states are better than more intensely positive states (e.g., Kuppens, Tuerlinckx, Russell, & Barrett, 2013; Russell, 1980). It was predicted that participants that were bored from a positive experience would be most likely to choose a worse subsequent state. This relationship was expected to be mediated by a desire to experience something negative, such that participants that viewed positive images would have a stronger desire to experience something negative, and this would predict choice of a worse experience. Desire for negative experience was chosen in Study 3 because the design allowed for multiple novel choices (and thus a measure of "desire for novelty" would not well represent the differences among the options). Finally, the manipulation and choices varied by affective valence and arousal, which allowed for considering the role of arousal in choice. The impact of arousal on choice, independent of valence, was theoretically unclear and was considered exploratory.

Theoretically, boredom was proposed to encourage a desire for novelty and change from the current state. The specifics of the desire engendered by boredom were unclear, as boredom could motivate a change from the current affective experience, level of arousal, or both. However, as the primary focus of this investigation was the relationship between boredom and anti-hedonic preference, arousal was not considered in primary analyses.

4.1 Participants

Undergraduate students (n = 145, 62% female) completed the study for partial course credit in their introduction to psychology course. Five participants were removed due to data loss as a result of experimenter or computer error.

4.2 Procedure

The study was similar in design to Study 2, with the following exceptions. Participants were randomly assigned within a 2 (valence condition: positive, negative) by 2 (arousal condition: low, high) design based on the images they viewed. For all conditions participants saw 15 images five times each. These images were selected from the IAPS image base (Lang et al., 2007). According to their standardized IAPS ratings, the image sets differed by affective valence, $F(3,68) = 624.43$, $p < .001$, $\eta^2 = .96$, and by arousal, $F(3,68) = 188.92$, $p < .001$, $\eta^2 = .89$, with the positive images being more positive than the negative images, and the high arousal images being more arousing than the low arousing images (see Table 1 for IAPS ratings). Eighteen of each type of image was selected. The image sets used for the boredom induction consisted of 15 of the 18 images from each type.

Participants were then told they would view a second set of images, and told about their options as in Study 2. In this study they were given four different image sets to choose from. These options consisted of the remaining three images from the 18 images of each type. This was to ensure that all sample images were novel, but also representative of the four types of images (sample image IAPS numbers by group: positive-high: 8034, 7405, 5470, positive-low: 2035, 5202, 5891, negative-low: 2455, 9001, 9331, negative-high: 1304, 9050, 9620). The sample image sets were presented in random order and were assigned labels of image set A, B, C, or D depending on their order of appearance.

Participants then rated their current level of boredom, as in Study 1, and then reported how much their selection was motivated by a desire for something negative, "How much did a desire for something negative motivate your choice?" Responses were given on a scale ranging from *Not at all* (1) to *Completely* (7). This measure was chosen in Study 3 because the design allowed for multiple novel choices. That is, three of the four choices given were completely novel, so desire for negative would provide more relevant information than a desire for novelty.

4.3 Results and Discussion

Condition was not expected to create a difference in state boredom in this study as all participants were exposed to their respective image sets for the same number of times. To examine potential differences in boredom across conditions, a 2 (valence: positive, negative) by 2 (arousal: high, low) ANOVA was conducted. As predicted, there was no effect of valence condition or arousal condition, and there was no interaction

effect, all F's < 1.56, all p's > .21. However, participants did report a moderate level of boredom (M = 5.79, SD = 1.62), as the average rating was greater than the mid-point of the scale (5), $t(144) = 5.91$, $p < .001$, $d = .99$. Thus, there was no difference across conditions in state boredom, but the induction of boredom appeared to be effective.

To examine the impact of the manipulation on desire for negative experience, a 2 (valence: positive, negative) by 2 (arousal: high, low) ANOVA was conducted. Valence condition affected the desirability of negative experience, $F(1,141) = 8.88$, $p = .003$, $\eta^2 = .06$, such that participants that viewed positive images reported a stronger desire for a negative experience (M = 2.49, SD = 1.73) than those that viewed negative images (M = 1.72, SD = 1.41). There was not a main effect of arousal condition, $F(1,141) = 2.18$, $p = .15$, $\eta^2 = .01$, or an interaction effect of valence and arousal condition, $F(1,141) = 0.24$, $p = .63$, $\eta^2 = .003$. Valence condition, but not arousal condition, affected desire for negative experience, with participants that viewed positive images reporting a greater desire for negative. As arousal level did not impact state boredom or desire for negative experience, and arousal is not a central to the current investigation, it was not considered further.

Overall, 22% of participants chose a set that was affectively worse than the one that elicited boredom, 26% chose an affectively equivalent set, and 52% chose an affectively better set. That is, nearly a quarter of the sample chose an experience would elicit worse feelings than their current state, as in Study 2. This is of particular interest in this sample as there were four options and thus multiple options would have been both novel and a better experience. This provides a powerful demonstration that a negative

experience will at times be chosen, even when a more positive alternative is available. Further, 41% of participants that viewed positive images chose a worse state, while only 1% of participants that viewed negative images chose a worse state (see Figure 2).

Valence condition (positive or negative) was expected to predict whether participants chose a better, worse or the same experience, and this relationship was expected to be mediated by desire for negative experiences. Specifically, it was predicted that participants bored by positive versus negative images would experience greater desire for negative experience, which would predict choosing an affectively worse image set. To examine this relationship, a mediation analysis was conducted utilizing the PROCESS script from Hayes (2013), and used 10,000 bootstrapped samples. As shown in Figure 3, condition (positive, negative) predicted desire for negative experiences, $b = -0.77$, $t = 2.93$, $p = .004$, with participants in the positive condition reporting a greater desire for negative experience compared to the negative condition. Desire for negative experiences predicted choice of image set, $b = -0.07$, $t = 2.36$, $p = .02$, with a stronger desire for negative experience predicting a greater likelihood of choosing an affectively worse experience. In the mediational model, there was a direct effect of condition on the type of experience selected, $b = 1.13$, $t = 12.21$, $p < .001$, such that participants in the positive condition were more likely to choose a worse experience. Consistent with predictions, there was also an indirect effect of condition on choice through desire for negative experience (indirect effect = .05, 95% CI [.008, .14]). Participants in the positive condition reported a stronger desire for negative experiences, and this desire predicted choice of an affectively worse experience.

5. STUDY 4

Studies 1-3 demonstrated that boredom increases a desire for novelty, which leads to anti-hedonic choice. However, the previous studies did not consider the potential boundary condition of role of preference in choice of an anti-hedonic experience. Previous research has demonstrated that people differ in their preference for specific emotional states (Harmon-Jones et al., 2011), and that individual differences in the experience of affect exist (Feldman, 1995; Kuppens et al., 2013). Study 4 was developed to provide a more accurate understanding of the type of people that make anti-hedonic choices when bored. Specifically, this study considered the role of preference for the negative image set. Participants were placed into a low or high state of boredom by viewing negative images, and then chose to view positive or negative images based on sample images. Negative images were selected to fully test the proposal that boredom creates a desire for novelty which encourages the pursuit of an experience that differs from the current state. The previous studies demonstrated that boredom can motivate an anti-hedonic choice, by motivating a desire for novelty. They did not, however, test if boredom motivates a choice for an experience that differs from the current state, if the current state is negative.

Study 4 was also designed to investigate the potential boundary condition of preferences for negative experiences. It was expected that, as in Study 2, boredom would increase desire for novelty and result in anti-hedonic choice. However, preference for negative images was predicted to moderate the effect of boredom on desire for novelty.

Specifically, participants in a high state of boredom, that did not like the negative image set, would experience more influence of a desire for novelty on their choice. However, participants in a low state of boredom, that did not like the negative image set, would experience less influence of desire for novelty on their choice. That is, desire for novelty would have an especially powerful impact on choice for participants that were intensely bored and did not like negative images, and less of an impact for participants that were less bored or who liked negative images.

5.1 Participants

Undergraduate students (n = 167, 55% female) completed the study for partial course credit. Three participants were removed due to data loss as a result of experimenter or computer error.

5.2 Procedure

Participants were randomly assigned to a high or low boredom condition. The procedure was the same as Study 2, except the boredom induction involved viewing negative images instead of neutral images. This negative image set consisted of 15 images that were pilot tested by another sample (n = 20, images were rated as more affectively negative (M = 3.18, SD = .93) than positive images (M = 6.72, SD = .60), $t(19) = 12.02$, $p < .001$, $d = 5.52$, on a 9-point scale, see Pilot 2 in the Appendix). Three negative images and three positive images from the pilot were selected to be used as the sample images for the next set to be viewed (positive images rated more positive (M = 6.77, SD = 0.61) than the negative decision images (M = 2.9, SD = 1.21), $t(19) = 11.30$, $p < .001$, $d = 5.18$). An additional item assessed preference for negative images (“How

did you feel about Image Set A [B]?"), on a scale ranging from *Extremely disliked* (1) to *Extremely liked* (7).

5.3 Results and Discussion

Participants in the high boredom condition reported a higher level of boredom (M = 6.86, SD = 1.99) than in the low boredom condition (M = 5.44, SD = 1.49), $t(148)$ = 5.20, $p < .001$, d = .85 (Levene's test indicated unequal variances (F = 14.02, $p < .001$) so degrees of freedom were adjusted from 165 to 148). Thus the manipulation of boredom was effective.

Overall, 25% of participants chose to view the negative image set. That is, when given the option to view positive images or negative images, a quarter of participants chose to view negative images similar to those that had caused boredom. As a preliminary analysis of choice, a logistic regression was conducted to examine the relationship between preference for negative images and choice of image set. Results showed that preference for the negative image set predicted choice, Wald = 10.72, β = 0.42, p = .001, e^{β} = 1.53, such that, as would be expected, participants that liked negative images were more likely to choose the negative image set.

The primary prediction was that desire for novelty would be especially likely to predict choice when participants were high in boredom and did not prefer negative images (see Figure 4 for conceptual model). To test this conditional indirect effect, the PROCESS script by Hayes (2013) was used (Model 7, 10,000 bootstrap resamples, 95% confidence interval). For this analysis, state boredom was entered as the independent variable (X), which was coded 0 = low boredom, 1 = high boredom. Desire for novelty

was entered as the mediator (*M*), with the dichotomous outcome variable (*Y*) choice of image set, coded as 1 = positive image set, 2 = negative image set.

The results of these analyses are displayed in Table 2. Replicating findings from Studies 2 and 3, participants in the high boredom condition versus low boredom condition reported a greater desire for novelty, $b = 1.60$, $t = 2.53$, $p = .013$, and participants that reported a greater desire for novelty were more likely to choose the affectively different positive image set, $b = -0.291$, $z = -2.88$, $p = .004$. Supporting the proposed moderated mediation model, the interaction between boredom condition and preference for negative images on desire for novelty, the mediator, was significant, $b = -0.43$, $t = -2.43$, $p = .0163$. To deconstruct this effect, the indirect mediational pathway effects of boredom condition on choice of image set through desire for novelty was examined at levels of the moderator (i.e., preference for negative images at the mean and one standard deviation above and below the mean). Consistent with predictions, the indirect mediation model was significant for participants that did not like negative images (i.e., one standard deviation below the mean; indirect effect = -0.25, 95% CI [-.7075, -.0262]), but not for participants that reported liking negative images. Also supporting that the indirect effect of boredom condition on image choice through desire for novelty was moderated by preference for negative images, the index of moderated mediation was significant (index = 0.1252, CI [.0186, .3183], demonstrating that the model differs depending on the level of preference for negative images. For participants that did not like the negative images, desire for novelty mediates the effect of boredom on choice of images, but it does not for participants that liked the negative images. These

findings suggest that the indirect effect of boredom condition on choice of image set through desire for novelty is moderated by preference for the negative image set. Specifically, desire for novelty predicted choice of image set when participants were high in boredom and did not prefer negative images.

This study demonstrated that preferences for negative stimuli play an important role in choice and act as a boundary condition on the impact of desire for novelty on choice. The desire for novelty predicted anti-hedonic choices primarily for participants that were in a high state of boredom and did not prefer negative images. This provides an important boundary to the previous findings: people may choose an anti-hedonic experience while during intense state boredom, however, preference for the outcome still impacts choice. Further, this study provides evidence that desire for novelty is not uniquely motivating anti-hedonic options, but is motivating choice for an experience that differs from that state that induced boredom (positive or negative).

6. SUMMARY AND CONCLUSIONS

The goal of the present investigation was to question a basic assumption that has been made about human behavior: pleasure is always chosen over pain. This idea has been considered so basic that many psychological and economic theories have been structured upon this assumption without ever actually testing it. Across three studies, participants were more likely to choose a negative experience, or a state worse than their current one, while in an intense state of boredom induced by a neutral or positive experience. Further, the effect of state boredom on choice was found to be mediated by a desire for novel experience, such that greater boredom predicted greater desire for novelty, which in turn predicted greater likelihood of choosing anti-hedonic options. Study 4 demonstrated, however, that this relationship is limited by preference for anti-hedonic experiences. This suggests that preference for an option can still guide choice even when in an intense state of boredom.

It is worth noting that the findings should be considered a demonstration of an anti-hedonic choice. Choosing the negative image set could potentially result in a more positive experience than the current state, if the chosen negative images are less negative than a state of boredom. However, if choices were made hedonistically (i.e., to increase the overall positive experience), the more positive available option should always be chosen, as it would result in the most positive return. Thus, the findings demonstrate a choice to actually experience something worse than another available option, or an anti-hedonic choice.

The current findings provide insight into the motivational and behavioral impacts of boredom. Researchers have long considered boredom an emotion (e.g., Dramrad-Frye Laird, 1989; Izard, 1971; Scherer, 1984), yet boredom has received relatively little empirical investigation compared to other emotions. Functional accounts of emotion hold that emotions serve a specific purpose, and result in changes in systems to enable goal pursuit (e.g., Carver, 2004; Frijda, 1986; Lench et al., 2011; Lench et al., under review; Keltner & Gross, 1999). Recently, boredom was proposed to serve the functional role of indicating that a current goal has lost potential value and an alternative goal may be more rewarding (Bench & Lench, 2013). Due to this, boredom would result in a desire for novelty, which, depending on the situation that elicited boredom, could result in anti-hedonic behavior. The current findings provide the first experimental evidence of this proposal.

Previous models have explained the pursuit of negative emotions and apparently anti-hedonic choice in a variety of ways (Andrade & Cohen, 2007; Erber & Erber, 2000; Harmon-Jones et al., 2011; Tamir, 2009). According to models of mixed emotions, negative emotional experiences may be chosen as they are not purely negative, but mixed with negative and positive (Andrade & Cohen, 2007; Larsen & McGraw, 2011). This would not be an anti-hedonic choice, as it would result in some form of positive reward. Although the findings in the present investigation do not directly contradict this account, it seems unlikely that it could account for the full pattern of results. Consistent with this account, it is possible that novel stimulation provided a positive reward, even if it was negative in affective valence. However, the impact of novelty on affective value

has a complicated history, with some research suggesting novel stimuli are more affectively pleasing (e.g., Berlyne, 1970), while other research suggests familiarity is preferred (e.g., Zajonc, 1968). Boredom is a negative and aversive emotional experience, and thus removing the state of boredom, even with something else that is negative, could result in a less negative experience. However, this account could not explain why participants chose the negative choice over the more positive available options. If an option was chosen to result in a more positive state than was currently being experienced, why would the novel and more positive available option not be chosen?

Previous research has also found that people have differing preferences for emotional experiences, and may choose one negative emotion over another (Harmon-Jones et al., 2011). As boredom is a negative emotion (e.g., Bench & Lench, 2013), it is possible that it is less preferred than other negative emotions, thus, choosing the negative image set results in an experience that is less negative than the current state. Again, however, this argument would be limited in that it cannot account for participants choosing the negative image option over the more positive image option, given that happiness is preferred to all negative emotions. Importantly, the current investigation did not give participants discrete emotion experiences to choose from (e.g., sad, angry, disgusting). Future research should consider the preference for the experience of boredom relative to other emotions more directly.

Finally, the current findings also provide evidence that anti-hedonic behaviors are not always the result of selecting a negative experience because it has long-term benefits. Previous research has demonstrated that negative emotional experiences will be

chosen when there is a benefit for doing so (Tamir, 2009; Tamir & Ford, 2009; Tamir et al., 2008). Participants in this investigation chose negative experiences without a stated benefit for doing so, and chose them over more affectively positive experiences. It is possible that participants expected a benefit for choosing the negative image set, but it would be unclear what would create this expectation, or why they could not have expected the same benefit for choosing the other available image set. Thus, the findings provide evidence that, at times, a negative emotional experience will be chosen over a more positive experience when there is not a benefit for said choice.

Practically speaking, the current findings speak to the potentially pervasive impact of boredom on behavior, given how frequently it occurs in daily life. Boredom has received little empirical attention, and has been considered ephemeral and inconsequential (Bench & Lench, 2013; Eastwood et al., 2012). However, this investigation demonstrated that state of boredom is highly aversive, and, in fact, is so powerful that it can motivate anti-hedonic choices that contradict fundamental assumptions about human behavior. People can grow bored with positive experiences and desire something negative, even at a cost. This could result in such acts as self-injury, self-degradation, and damaging social relationships.

Psychology and economics have always assumed that the ultimate motivation of behavior is to maximize pleasure and minimize pain. The current findings provide evidence that this is not always the case. Anti-hedonic behaviors and motivations may be more common than once thought. This calls for reconsidering the basic assumptions of human motivation that serve as the foundation of psychological theory.

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APPENDIX A

FIGURES

Figure 1. Boredom indirectly affected choice of image set through its influence on desire for novelty (Study 2).

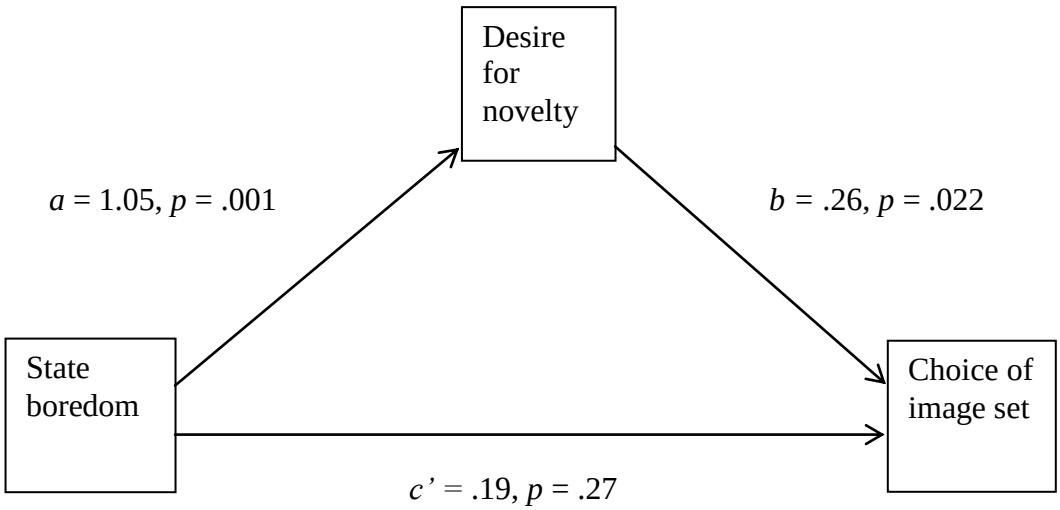


Figure 2. Percentage of participants that made each type of choice, split by the image condition they were assigned (Study 3).

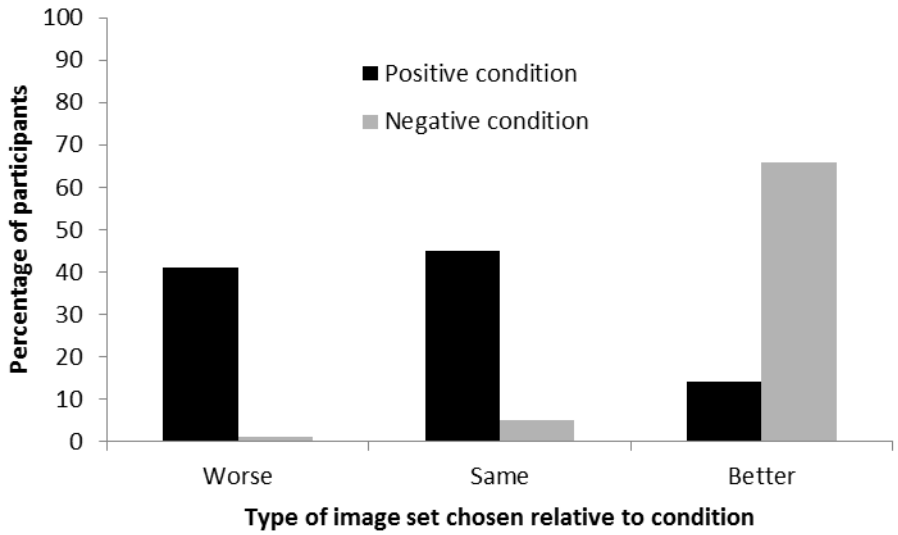


Figure 3. Boredom indirectly affected choice through its influence on desire for negative (Study 3).

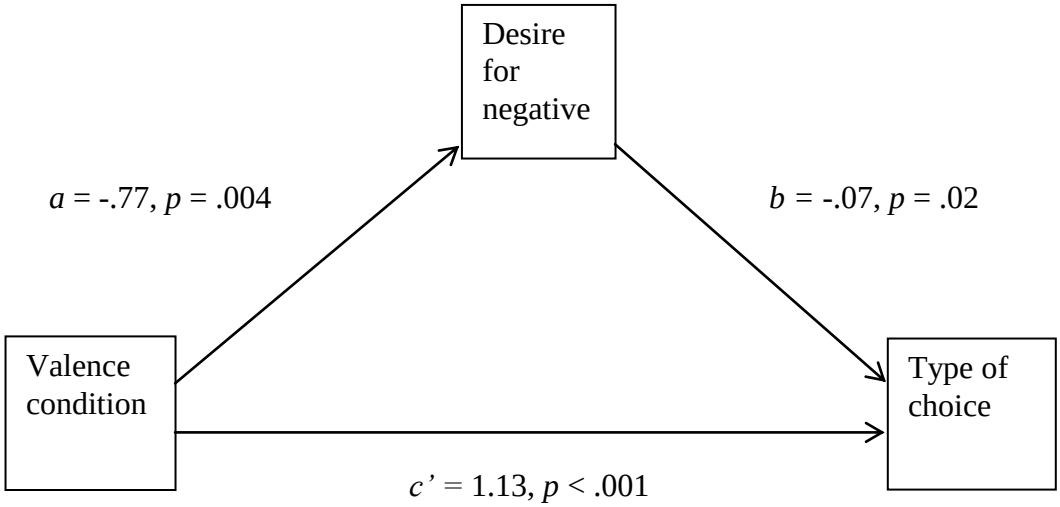
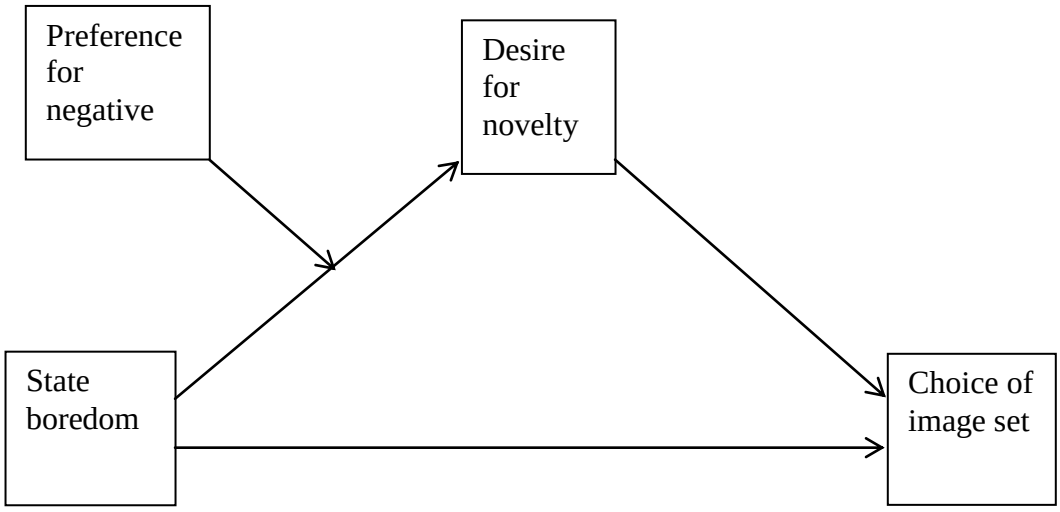


Figure 4. Moderated mediation model. The conditional indirect effect of state boredom on choice of image set through desire for novelty, moderated by preference for the negative sample images (Study 4).



APPENDIX B

TABLES

Table 1.
Mean IAPS affective valence and arousal ratings for images selected for Study 3.

	Positive-high	Positive-low	Negative-high	Negative-low
Affective Valence	$7.33(0.30)_a$	$7.29(0.21)_a$	$2.78(0.52)_b$	$3.05(0.58)_b$
Arousal	$6.59(0.42)_a$	$3.93(0.53)_b$	$6.47(0.37)_a$	$4.16(0.44)_b$

Note. The selected images were grouped to differ on either affective valence or arousal ratings. Ratings were those reported in the IAPS report (Lang et al., 2008). Standard deviations presented in parentheses. Means within a row with different subscripts differ at $p < .001$.

Table 2.
Regression results for moderated mediation model of state boredom on choice of image set through desire for novelty with preference for the negative images as a moderator of the relationship (Study 4).

Predictor	Estimate	SE	*t*	*p*
	Desire for novelty (mediator variable model)			
Constant	4.28	0.46	9.36	0.0000
Boredom condition (0 = Low; 1 = High)	1.60	0.63	2.53	0.013
Preference for negative	0.10	0.13	0.80	0.43
Boredom condition X preference for negative	-0.43	0.18	-2.43	0.016
	Choice of image set (dependent variable model)			
Constant	0.11	0.50	0.21	0.83
Desire for novelty	-0.29	0.10	-2.88	0.004
Boredom condition	0.17	0.37	0.47	0.64
	Conditional effects of preference for negative			
Preference for negative	Bootstrap indirect effect	Bootstrap SE	95% CI bias corrected	
1.69 (-1 *SD*)	-0.25	0.16	-0.7075	-0.0262
3.23 (Mean)	-0.06	0.09	-0.2988	0.0821
4.78 (+1 *SD*)	0.13	0.13	-0.0636	0.4439

n = 166. Unstandardized regression coefficients reported. Bootstrap sample size = 10,000

APPENDIX C

PRELIMINARY STUDIES

The goal of these studies was to establish the affective experience of images used in the study design (Pilot 1, 2), and assess the effectiveness of the methodology in eliciting boredom (Pilot 3).

Pilot 1

The purpose of this study was to establish ratings of the images used in subsequent studies. A total of 40 images were selected, 20 neutral and 20 negative. Neutral and negative were selected to assess if negative images would be chosen over neutral images. This was done because a choice of negative over positive seemed intuitively unlikely. No positive images were included.

Participants

Twenty-six college students (65% female) completed the study for partial course credit in their introduction to psychology course.

Procedure

Participants viewed 40 images, and then rated the images on a variety of measures. Each image was displayed for five seconds. Immediately following the image participants rated the image on affective valence on a scale ranging from *Completely negative* (1) to *Completely positive* (9), and arousal on a scale ranging from *Calm* (1) to *Intensely arousing* (9). Specifically, they were asked, "This image make me feel" and asked to use the scale to respond. Participants then rated the level of complexity, captivity, interest, relevance, and familiarity that each image possessed on a scale

ranging from *Not at all* (1) to *Extremely* (9). Images were selected from the International Affective Picture System (IAPS; Lang, Bradley, & Cuthbert, 2008). Half of the images selected were rated as negative in the IAPS system (IAPS numbers: 1274, 5971, 5973, 7135, 7359, 7520, 9001, 9008, 9031, 9090, 9102, 9110, 9182, 9186, 9373, 9390, 9395, 9445, 9471, 9621), and half were rated as neutral (IAPS numbers: 1350, 1903, 5395, 5471, 5510, 5740, 7017, 7019, 7026, 7043, 7090, 7160, 7170, 7179, 7187, 7233, 7247, 7255, 7365, 7547). Pictures were presented in a random order.

Results and Discussion

Ratings were compared using a series of *t*-tests. Images were considered either neutral or negative according to their IAPS ratings. One neutral image (IAPS number: 7017; a VHS tape) was rated more positively ($M = 7.00$, $SD = 1.41$) than the average of the other neutral images ($M = 5.63$, $SD = .63$), $t(25) = 5.49$, $p < .001$, $d = 2.20$. This image was removed from subsequent analyses, and not used in future studies. As expected, negative images were rated as more affectively negative ($M = 2.93$, $SD = .90$) than neutral images ($M = 5.63$, $SD = .63$), $t(25) = 15.95$, $p < .001$, $d = 6.38$. Importantly, negative images differed from the neutral point on the scale (5), $t(25) = 11.64$, $p < .001$, $d = 4.66$, and neutral images differed from the negative anchor of the scale (1), $t(25) = 37.59$, $p < .001$, $d = 15.04$. Finally, neutral images differed from the neutral point on the scale (5), $t(25) = 5.08$, $p < .001$, $d = 2.03$, demonstrating that neutral images were viewed, overall, as slightly positive. Thus, negative images were considered actually negative, and neutral images were considered slightly positive, as opposed to being relatively different from the other set.

Negative images were rated as more arousing (M = 4.85, SD = 1.65) than neutral images (M = 3.55, SD = 1.43), $t(25) = 3.65$, $p = .001$, $d = 1.46$. This was expected due to the original IAPS ratings. The images were carefully selected in an effort to find negative and neutral images that were similar in arousal, but it was ultimately not possible to find images that matched on arousal ratings. Most negative images are in some way arousing, and most neutral images are not arousing.

Neutral images were rated as more familiar (M = 5.08, SD = 1.18) and more relevant (M = 4.27, SD = 1.17) than negative images ($M_{familiar}$ = 4.19, SD = 1.17, $M_{releveant}$ = 3.33, SD = .97), $t_{familiar}(25) = 5.74$, $p < .001$, $d = 2.30$, and $t_{releveant}(25) = 5.91$, $p < .001$, $d = 2.36$. These findings were unexpected. While neutral was rated as more familiar than negative, it was not greater than the mid-point of the scale (5), $t(25) = 0.35$, $p = .73$, $d = 0.14$, suggesting that neither set of images was considered particularly familiar. Similarly, neither set of images reached the mid-point of the scale (5) for relevance, suggesting that neither set was considered particularly relevant. Neutral and negative images did not differ in captivity, complexity or interest, all t's < 0.99, all p's > .33

This pilot provided a set of images that were rated for use as negative and neutral image sets. One image (IAPS number: 7017; a VHS tape) was rated unexpectedly positive, and was removed from the study sample. All other images were rated similar to their original IAPS ratings and in accord with expectations based on those ratings. These image sets were then used for Study 1 and Study 2.

Pilot 2

The purpose of this study was to establish ratings of the images used in subsequent studies. A total of 36 images were selected, 18 positive and 18 negative. These images were selected from the IAPS image set, and were chosen based on their valence and arousal rating. All selected images had a low IAPS rating of arousal.

Participants

Twenty college students (70% female) completed the study for partial course credit in their introduction to psychology course.

Procedure

Participants viewed 36 images, and then rated the images on a variety of measures. Each image was displayed for five seconds. Immediately following the image participants rated the image on affective valence on a scale ranging from *Completely negative* (1) to *Completely positive* (9), and arousal on a scale ranging from *Calm* (1) to *Intensely arousing* (9). Specifically, they were asked, "This image made me feel" and asked to use the scale to respond. Participants then rated the level of complexity, captivity, interest, and meaning that each image possessed on a scale ranging from *Not at all* (1) to *Extremely* (9). Images were selected from the International Affective Picture System (IAPS; Lang, Bradley, & Cuthbert, 2008). Eighteen of the images selected were rated as negative in the IAPS system (IAPS numbers: 5971, 9001, 9090, 9471, 2455, 2750, 6010, 2039, 2456, 2590, 9190, 9331, 2490, 9000, 2205, 2276, 2722), and 18 were rated as positive (IAPS numbers: 5982, 1604, 7430, 2598, 2360, 7200, 5201, 5202,

5551, 5814, 5725, 7280, 5781, 5891, 7325, 2035, 5471, 7255). Pictures were presented in a random order.

Results and Discussion

Ratings were compared using a series of *t*-tests. Images were considered positive, neutral or negative according to their IAPS ratings. As expected, negative images were rated as more affectively negative (M = 3.18, SD = .93) than positive images (M = 6.72, SD = .60), $t(19) = 12.02$, $p < .001$, $d = 5.52$. Importantly, negative images differed from the neutral point on the scale (5), $t(19) = 8.76$, $p < .001$, $d = 4.02$, and positive images differed from the neutral point of the scale, $t(19) = 12.83$, $p < .001$, $d = 5.89$. Thus, negative images were considered negative, while positive images were considered positive, as opposed to being relatively different from the other set.

Negative images were rated as more complex (M = 5.08, SD = 1.27) than positive images (M = 4.25, SD = 0.97), $t(19) = 3.17$, $p = .005$, $d = 1.46$. While positive images were more captivating (M = 5.91, SD = 1.01) and interesting (M = 6.32, SD = 0.87) than negative images ($M_{captive}$ = 5.18, SD = 1.31; $M_{interest}$ = 5.83, SD = 1.01), $t_{captive}(19) = 2.10$, $p = .05$, $d = .96$, and $t_{interest}(19) = 2.08$, $p = .05$, $d = .95$. Positive and negative images did not differ on arousal or meaning, t's < 1.47, p's > .16.

Three images from each of the two sets of 18 (positive IAPS numbers: 5202, 5551, 5891 and negative IAPS numbers: 9001, 2039, 2722) were selected to be used as sample decision images. These images were matched to be as similar as possible on the six rated criteria. The three positive decision images differed on valence (M = 6.77, SD = 0.61) from the negative decision images (M = 2.9, SD = 1.21), $t(19) = 11.30$, $p < .001$, d

= 5.18. The decision image sets did not differ on arousal, meaning, and interest, all *t*'s < 0.99, all *p*'s > .34. The positive decision set was more captivating (*M* = 6.65, *SD* = 1.15) than the negative decision set (*M* = 5.78, *SD* = 1.63), *t*(19) = 2.13, *p* = .047, *d* = 0.98. The negative decision set was marginally more complex (*M* = 5.35, *SD* = 1.93) than the positive decision set (*M* = 4.50, *SD* = 1.22), *t*(19) = 1.83, *p* = .084, *d* = 0.84.

This pilot provided a set of images that were rated for use as negative and positive image sets. All images were rated similar to their original IAPS ratings and in accord with expectations based on those ratings. This rating provided study stimuli that differed on valence, but did not differ on arousal and meaning. The positive and negative image sets from this pilot were used in Pilot 3 and Study 3.

Pilot 3

The purpose of this study was to determine the number of times each image should be displayed to create a high level of boredom, and to examine a potential difference in effect of viewing positive and negative images. Participants viewed the positive or negative image sets from Pilot study 3 either 10, 12, or 14 times, before rating their level of boredom.

Participants

Sixty-three college students (60% female) completed the study for partial course credit in their introduction to psychology course.

Procedure

This study was a 3 (number of views) by 2 (affective valence) design to establish the number of views required to elicit a high degree of boredom and to test for potential

difference in effect for viewing positive and negative images. Participants were seated, then rated their current level of boredom on a scale ranging from *Not at all* (1) to *Extremely* (9). Then they viewed the positive or negative image set from Pilot study 3. Each of the 15 images in the set was displayed 10, 12, or 14 times. Each image was displayed for five seconds. Immediately following the images participants again rated their current level of boredom on the same scale as before.

Results and Discussion

There was no effect of condition on post induction boredom. Participants that viewed the images 10, 12, or 14 times did not differ on their level of reported boredom, $F(2, 60) = 1.45$, $p = .24$, $\eta^2 = .05$. The valence of the image set also did not impact post-induction boredom ratings, as participants that viewed the positive and negative image sets did not differ in their boredom, $F(1, 62) = .22$, $p = .64$, $\eta^2 = .004$. However, the boredom induction was effective as participants (across conditions) reported a lower level of boredom before the induction ($M = 3.94$, $SD = 2.15$) than they did after the induction ($M = 7.37$, $SD = 2.00$), $t(62) = 9.53$, $p < .001$, $d = 2.42$. Further, the post induction level of boredom differed significantly from the mid-point of the scale (5 – representing a moderate level of boredom), suggesting that a high level of boredom was elicited, $t(62) = 9.57$, $p < .001$, $d = 2.43$. Thus, the manipulation was effective at inducing boredom.

This study demonstrated that the boredom manipulation is effective at eliciting a high state of boredom. Further, it established that there is no difference in reported level of boredom after an induction that involves positive or negative images. Finally, as

boredom does not increase after 10 viewings of each image in an image set, it was determined that future studies would use 10 viewings.